

The genus *Amalda* in New Caledonia (Mollusca, Gastropoda, Olividae, Ancillinae)

by Richard N. KILBURN and Philippe BOUCHET

Abstract. — Four new species and one subspecies are described from deep water in the New Caledonian region : *Amalda fuscolingua*, *A. aureomarginata*, *A. coriolis*, *A. bellonarum* and *A. hilgendorfi richeri*. *A. montrouzieri* (Souverbie, 1860) is redescribed and discussed. SEM photographs of radulae are included.

Résumé. — Quatre espèces et une sous-espèce nouvelles d'*Amalda* sont décrites de la région néo-calédonienne, d'où le genre n'était jusqu'ici connu que par la présence d'*A. montrouzieri* (Souverbie, 1860). Cette espèce des fonds blancs du lagon est redécrite et son statut discuté. *A. aureomarginata* n. sp., *A. fuscolingua* n. sp. et *A. hilgendorfi richeri* n. ssp. sont des espèces bathyales de Nouvelle-Calédonie, où elles vivent sur des fonds durs et grossiers entre 300 et 600 m ; *A. coriolis* n. sp. n'est connu que des plateaux sommitaux des bancs Capel et Kelso, en mer du Corail, vers 150-300 m de profondeur ; *A. bellonarum* n. sp. est une espèce de la pente du plateau Chesterfield-Bellona entre 45 et 240 m.

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INTRODUCTION

This paper deals with a collection of Ancillinae from the New Caledonian region, from which only a single species, *Amalda montrouzieri* (Souverbie, 1860), was previously known. We here describe 4 new species and 1 subspecies, which were dredged offshore and down to 600 m during several deep-sea programmes carried out in the area since 1978. Most of the material was taken during the last three years by expeditions under the direction of Dr. B. RICHER DE FORGES and Prof. C. LÉVI. The second author has participated in many of these expeditions, and we thank the cruise leaders for placing this material at our disposal. Mimeographed cruise reports have been produced for some of these expeditions (RICHER DE FORGES *et al.*, 1984, 1986a, 1986b, 1987) and we refer to these for further information.

SUBSTRATA : The deep-water *Amalda* species here discussed were dredged on coarse bottoms, rich in stylasterids, stylasterid fragments, shells and other biogenic debris. Shallow-water populations of *Amalda montrouzieri* were taken on white coral sand.

METHODOLOGY : Terminology pertaining to shell structures in the Ancillinae follows KILBURN (1977). Colour descriptions (other than those given under diagnosis and discussion) follow the ISCC-NBS system. In the case of species with morphologically varying populations,

the type material (and species description) is based on material of the typical population, but the diagnosis covers the full range of such variation.

All material, unless otherwise indicated, is lodged in the MNHN collection.

Genus *AMALDA* H. & A. Adams, 1853

TYPE SPECIES (SD Vokes, 1939) : *Ancillaria tankervillii* Swainson, 1825.

NOTE : No satisfactory subgeneric classification for the genus *Amalda* exists at this stage, and we have avoided formal utilization of subgenera, although in discussing each species we suggest probable relationships.

KEY TO NEW CALEDONIAN *Amalda* SPECIES

1. Protoconch covered by spire callus *montrouzieri*
— Protoconch exposed 2
2. Body whorl with faint brown spots; primary spire callus with more or less distinct spiral grooves adult size small (< 15 mm) and narrow (b/l 0.36-0.40) *bellonarum*
— Body whorl without spots; primary spire callus without distinct spiral ridges, adult size larger (> 15 mm) and usually broader (b/l 0.39-0.51) 3
3. Body whorl with a slight but distinct, ridge-like shoulder; secondary callus pad conspicuously white *coriolis*
— Body whorl without an angular shoulder, secondary callus pad not conspicuously white 4
4. Aperture bluntly rounded posteriorly; primary spire callus with oblique, opaque rays; apex bluntly conical, shell distinctly bilaterally asymmetrical; secondary callus pad usually dark brown *fuscilingua*
— Aperture acutely angled posteriorly; spire callus without opaque rays; apex acute, sometimes papilliform or mammilliform; shell not markedly bilaterally asymmetrical 5
5. Ancillid groove commencing at level of posterior angle of aperture; aperture pinkish/purplish; smaller (adult length < 35 mm); spire always acutely conical with relatively thin callus *aureomarginata*
— Ancillid groove commencing at mid-parietal level; aperture not pinkish/purplish; larger (< 75 mm); spire typically as above, but sometimes strongly calloused and cyrtconoid, with mammilliform apex *hilgendorfi richeri*

Amalda montrouzieri (Souverbie, 1860)

(Figs. 1-8, 38-39, 51, 53)

Ancillaria montrouzieri Souverbie, 1860a : 207 ; *idem*, 1860b : 324, pl. 11, fig. 3 ; REEVE, 1864 : pl. 4, fig. 9 ; WEINKAUFF, 1878 : 17, pl. 5, figs. 5, 6, pl. 7, fig. 3 ; DUNKER, 1882 : 47. Type locality : " Insul. Lifu? (Loyalty). Insul. Art? " [1860a]; l'île des Pins, New Caledonia [1860b].
Ancilla montrouzieri ; DAUTZENBERG, 1928 : 147 (references).
Ancilla (Baryspira) montrouzieri ; CERNOHORSKY, 1972 : 167, pl. 48, fig. 6.
Baryspira sinensis [non Sowerby, 1859] ; KURODA, 1960 : 76 ; HABE, 1964 : 104, pl. 33, fig. 14.

DIAGNOSIS : Shell typically oblong-ovate-fusiform, b/l 0.38-0.47, a/l 0.47-0.53, spire cyrtconoid, angle 35°-56°; apex somewhat mammillate; entire spire covered in primary callus, which is not distinctly microshagreened, and usually shows weak spiral lirae (8-10 on penultimate whorl); secondary callus forming extensive pad on right side of spire; columella pillar with 2-4 pleats (usually 3), not distinctly microshagreened; ancillid groove feeble to deep; pinkish-white to light pinkish- or yellowish-brown, with cream to light orange-brown spire callus and posterior fasciolar band, sometimes with a deep pink blotch on right side of spire. Maximum length 39 mm.

DESCRIPTION : Shell oblong-ovate-fusiform with relatively broad base, b/l 0.38-0.47; body whorl evenly convex on both sides, greatest width more or less median; aperture moderately large, a/l 0.47-0.53. Spire cyrtconoid with somewhat mammillate apex, spire angle 35°-56°; primary callus thick and enveloping entire spire, slightly impressed at final suture only; surface of callus glossy, not distinctly microshagreened, but usually with faint to distinct spiral ridges, numbering 8-11 on penultimate whorl; secondary callus forms a pad covering entire right side of spire, sometimes extending over ventral surface as well, continuous with the thick, sometimes ridge-like parietal callus. Aperture lanceolate, very bluntly rounded posteriorly, widest more or less medially; outer lip very slightly prosocline, with a very blunt basal denticle; siphonal notch rather deep, asymmetrically U-shaped. Columella pillar moderately twisted, its termination acute, with a rather deep basal notch; pleats 3, rarely 2 or 4, the innermost relatively weak, the outermost pleat separated from others by a wider, slightly deeper groove; microshagreen sculpture scarcely visible on columella pillar, although outermost ridge is sometimes weakly nodular. Anterior fasciolar groove fairly wide and deep, its band somewhat flattened; posterior fasciolar band flattened to slightly concave; border of anterior fasciolar band raised slightly above edge of posterior one, and margin of posterior band raised slightly above ancillid band; ancillid groove moderately deep (occasionally feeble), its band very slightly depressed. Median zone and ancillid band with fine growth-lines and traces of scratch-like spiral striae. Number of teleoconch whorls indeterminate.

Coloration : Pale form pinkish- to yellowish-white with opaque yellowish-white spire callus and posterior fasciolar band. Dark form with median area of body whorl pale yellowish-pink to light yellowish-brown, primary spire callus tinged with moderate orange/orange-yellow (secondary callus usually suffused with dark yellowish-pink to moderate orange) as is posterior fasciolar band, rest of base white; aperture yellowish-white to light orange.

Protoconch (figs. 38-39) narrowly domed, 1st whorl blunt, limits ill-defined.

Dimensions : 39.3 × 16.2 mm, 20.9 × 8.7 mm (largest and smallest adults examined).

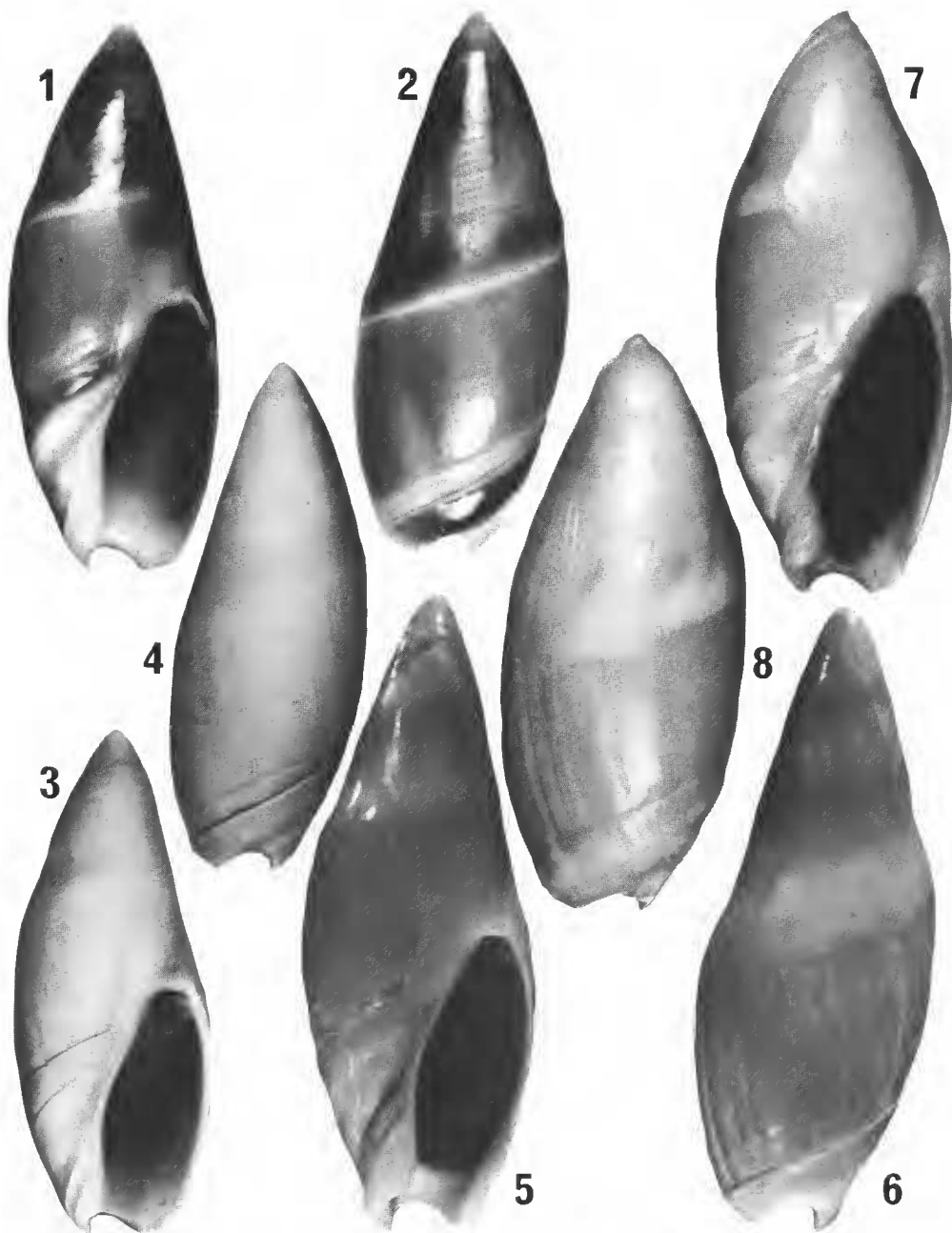
Operculum filling aperture, shape narrowly elliptical, anterior end broadly rounded; nucleus eccentric, near anterior end; translucent, deep orange-yellow.

Radula (figs. 51, 53) : Rachidian with side cusps barely stronger than median cusp; tiny, irregular denticles developed on bases of cusps.

DISTRIBUTION : New Caledonia, with extralimital records from Fiji and Ryukyu Islands, 5-280 m.

TYPE MATERIAL : Holotype probably in the Bordeaux Museum (see below).

MATERIAL EXAMINED : 51 lots (ca. 110 examples, lv and dd) from the south-eastern part of New Caledonia (Programme LAGON), from Baie de Saint-Vincent to île des Pins, at depths of 5-70 m. Only two lots examined from outside S.E. New Caledonia : Surprise Atoll (18°21' S, 163°03' E), 44 m, 1 small lv. (LAGON Stn 464); Capel Bank (25°20' S, 159°44' E), 56 m, 2 lv., 1 dd (MUSORSTOM 5, Stn 264).



FIGS. 1-8. — *Amalda montrouzieri* (Souverbie, 1860) : 1-2, specimen from southern New Caledonia, N. O. " Vauban " Stn 334, 22°38' S, 166°54' E, 47 m, length 27.0 mm ; 3-4, same specimen coated to enhance sculptural details ; 5-6, specimen from deep water, southern New Caledonia, SMIB 2, Stn 23, 22°31' S, 167°37' E, 410-420 m, length 30.1 mm ; 7-8, specimen from Capel Bank, Coral Sea, MUSORSTOM 5, Stn 264, 25°20' S, 159°44' E, 56 m, length 29.0 mm.

Several additional samples originate from deeper water : 22°40' S, 167°19' E, 130 m, 2 worn shells (LAGON Stn 417) ; 22°44' S, 167°19' E, 95-100 m, 3 lv. (LAGON Stn 580) ; 23°40' S, 168°00' E, 280 m, 1 fresh dd (SMIB 3, Stn 20).

EXTRALIMITAL RECORDS : Loyalty Islands (IRSN : R. LAMBERT, GAY) ; Fiji (CERNOHORSKY, 1972) ; Ryukyu Islands : trawled (NM G8200 : L. MOORE) ; Miyako Is. (KURODA (1960), as *Baryspira sinensis*, photograph of actual specimen examined courtesy of Dr. M. HORIKOSHI, same example evidently illustrated by HABE (1964 : pl. 33, fig. 14)).

Unconfirmed : Philippines (HABE, 1964), also see references in DAUTZENBERG (1928).

NOTES : SOUVERBIE (1860*b*) clearly stated in his discussion that at the time of his original paper (1860*a*) he possessed only a single rather bleached specimen [= the holotype], but that he had subsequently examined three good examples in the BERNARDI collection, which he incorporated into his 1860*b* description. The shell figured by him (now in the MNHN collection) appears to be a BERNARDI specimen, and therefore has no type status.

Pale and dark colour forms occur, the latter occasionally labelled in old collections with the MS name "*Ancillaria obscurata*".

DAUTZENBERG (1928) erred in suggesting that within New Caledonia *A. montrouzieri* was restricted to l'île des Pins. Details of its range in the tropical Pacific require investigation. However, it has been recorded from Fiji, and Ryukyu examples appear to agree well with typical New Caledonian material. Such specimens have been erroneously recorded by Japanese writers as *Ancillaria sinensis* Sowerby, 1859 ; the holotype (BM(NH) 197822) of that is a specimen of the eastern Australian species later described as *Ancillaria fusiformis* Petterd, 1886 (*non* J. de C. Sowerby in Dixon, 1850) and *Baryspira fusiformis gaza* Iredale, 1924 (syntype examined, BM(NH) 27.2.9.787).

The conspicuously cyrtoconoid spire, which gives the shell an elongately pupiform shape, is characteristic of typical members of the subgenus *Alocospira* Cossmann, 1899. The only other described tropical Pacific species that may be referable to *Alocospira* (see note under *Amalda bellonarum*) is the aberrant *A. mamillata* (Hinds, 1844), from the South China Sea ; this differs from *montrouzieri* in coloration and in its strongly ridged, less convex-sided spire which is covered by rather thin primary callus.

In New Caledonia, typical specimens of *A. montrouzieri* are known mostly from depths of 10-130 m. (An old shell from Vauban station 23 (22°50' S, 167°16' E, 480-505 m), inhabited by a pagurid, is presumed to have been derived from a shallow-water population). In deeper water (175-420 m) occurs a puzzling morph which is uniformly different in shape (although there are indications of intergradation in this regard) and in its faint ancillid groove ; in other characters it agrees with typical *montrouzieri*. It is more biconical than *montrouzieri* (b/l 0.39-0.44, a/l 0.44-0.49), its spire callus is thinner, rendering the spire profile only weakly cyrtoconoid to almost orthoconic, the spire angle is narrower (28°-40°) and the left side of the body whorl is flatter so that the posterior callus forms a slight shoulder ; in all specimens the colour is uniform white and the largest measured is 31.2 × 12.7 mm. The status of this form requires further investigation. Material has been examined from : 22°19' S, 167°10' E, 220-230 m, 8 dd (R.V. "Vauban" 1978-9, Stn 8) ; 22°20' S, 167°10' E, 175-200 m, 1 dd (do, Stn 9) ; 22°09' S, 167°05' E, 230-260 m, 3 dd (do, Stn 42) ; 22°31' S, 167°37' E, 410-420 m, 5 dd (SMIB 2, Stn DW 23).

***Amalda aureomarginata* sp. n.**

(Figs. 9-17, 44-45, 52, 55, 56)

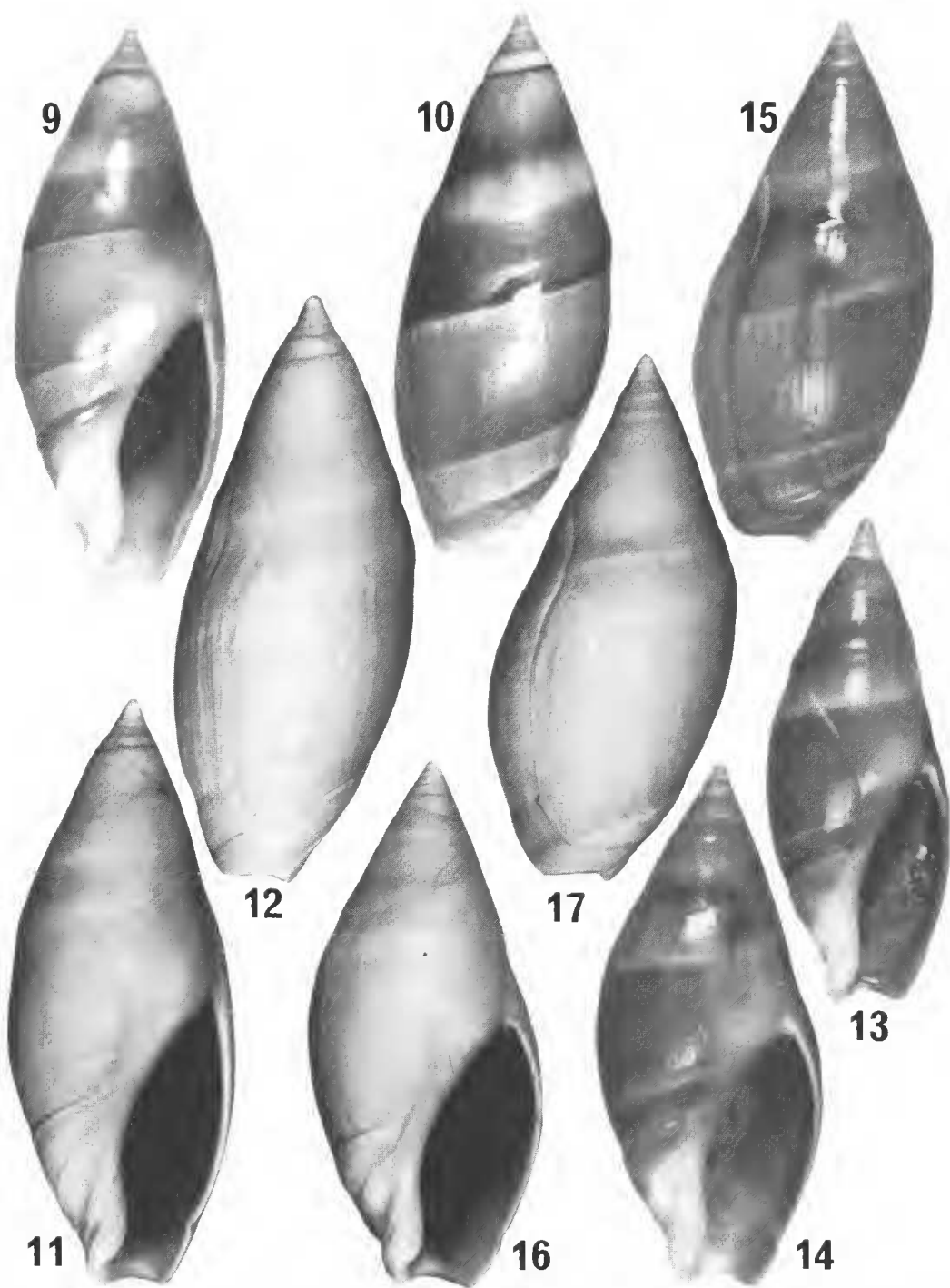
DIAGNOSIS : Shell ovate-fusiform, b/l 0.39-0.47, with a narrow base and high, acutely conical spire a/l 0.43-0.51, spire angle 29°-52°, aperture relatively small ; primary spire callus enshrouding all except protoconch and 1st two teleoconch whorls, secondary callus a fairly thin, linguiform pad which extends to second last suture ; ancillid groove fairly deep, commencing at level of posterior angle of aperture, denticle weak ; columella with 4-7 ridges, sometimes bifid. Colour either : (a) light yellowish-brown with a paler ancillid band, spire callus on body whorl and posterior fasciolar band brownish-orange, secondary callus and median part of spire purple, aperture pink ; or (b) dull pinkish-brown, spire callus and posterior fasciolar band light orange-brown, with or without purple tinge at suture, aperture pinkish-brown. Maximum length 34.5 mm.

DESCRIPTION (typical population) : Shell ovate-fusiform with relatively narrow base, b/l 0.38-0.42 ; body whorl evenly convex on right side, slightly drawn in at ancillid groove, somewhat flattened above periphery on left, subsutural callus sometimes a little tumid, greatest width of body whorl median ; aperture relatively small and narrow, a/l 0.43-0.49. Spire high and acutely conical, apex sometimes papilliform, angle 29°-45° ; primary callus fairly thick and enshrouding all except protoconch and first 2 teleoconch whorls, sometimes slightly impressed at sutures ; surface of callus glossy but very finely microshagreened ; parietal callus continues up right side of undersurface to form a fairly thin, linguiform pad of secondary callus that reaches the antepenultimate suture. Aperture lanceolate, acute posteriorly, widest medially ; outer lip rather thin, in side-view very slightly prosocline and medially concave, with a slight, rather blunt basal denticle ; siphonal notch shallow, asymmetrically U-shaped. Columella pillar moderately twisted, its termination acute, with a fairly deep basal notch ; pleats 6-7, but dividing towards aperture so that as many as 12 may be counted on inner margin of columella ; outermost pleat (which may split into three) separated from others by a wider, slightly deeper groove, but is no stronger than the adjacent pleat ; microshagreen sculpture very fine, slightly coarser in grooves. Anterior fasciolar groove wide and fairly shallow, its band concave to weakly convex ; posterior fasciolar band convex, with a slight median ridge ; border of anterior fasciolar band raised slightly above edge of posterior one, and margin of posterior band raised slightly above ancillid band ; ancillid groove shallow, commencing at level of posterior angle of aperture, ancillid band not depressed. Median zone and ancillid band with fine growth-lines, becoming coarser behind lip and on base, with traces of scratch-like spiral striae. Teleoconch whorls probably about 5.

Colour-pattern is complex : Median area of body whorl strong to light yellowish-brown, ancillid band pale yellowish-pink ; posterior fasciolar band and spire-callus on body whorl deep orange-yellow, the latter bordered anteriorly and posteriorly by a darker line ; anterior fasciolar band whitish ; secondary callus, upper part of parietal callus and median part of primary spire callus coloured in various shades of reddish-purple or purplish-pink ; columellar pillar white ; aperture light greyish-red.

Protoconch (figs. 44-45) narrowly domed, 1st whorl rounded and tilted, limit ill-defined, but probably consisting of about 1.5 whorls, breadth approximately 1.5-1.7 mm.

Dimensions : 34.1 × 13.9 mm (holotype).



FIGS. 9-17. — *Amalda aureomarginata* sp. n. : 9-10, holotype, BIOCAL Stn 45, 22°47' S, 167°15' E, 430-465 m, length 34.1 mm ; 11-12, same specimen coated to enhance sculptural details ; 13, paratype, population variant from northern New Caledonia, MUSORSTOM 4, Stn 195, 18°55' S, 163°22' E, 465 m, length 27.8 mm ; 14-15, paratype, population variant from Chesterfield area, MUSORSTOM 5, Stn 337, 19°54' S, 158°38' E, 412-430 m, length 30.7 mm ; 16-17, same specimen, coated.

Operculum as in *A. montrouzieri* but more narrowly rounded anteriorly.

Radula (figs. 52, 55, 56) : Rachidian with median cusp shorter and more slender than side cusps, bases of cusps with or without tiny, irregular denticles.

DISTRIBUTION : Three populations (Chesterfield, northern and southern New Caledonia) are known, each showing discrete morphological variation (see under notes) ; all have the same depth range of 350-500 m, with occasional records as shallow as 300 m and as deep as 580 m.

TYPE MATERIAL : Holotype (figs. 9-10) in MNHN, Southern New Caledonia, 22°47' S, 167°15' E, 430-465 m, lv. (BIOCAL, Stn 45). Paratypes : Southern New Caledonia : 22°58' S, 167°33' E, 410-440 m, 7 lv. and 11 dd, MNHN, 1 lv., NM K3040/T25 (MUSORSTOM 4, Stn 222) ; 22°52' S, 167°13' E, 415 m, 53 lv. and dd (SMIB 1, Stn 2). Collected in 1985-87 by G. BARGIBANT, P. BOUCHET, J. L. MENOU, B. MÉTIVIER, B. RICHER DE FORGES and P. TIRARD on board R. V. "Jean-Charcot" and R. V. "Vauban".

OTHER MATERIAL : **Chesterfield** : 19°54' S, 158°38' E, 412-430 m, 5 dd (MUSORSTOM 5, Stn 337) ; 19°53' S, 158°38' E, 400 m, 8 lv., 3 dd (do, Stn 361) ; 19°53' S, 158°40' E, 370-400 m, 6 lv., 12 dd, 1 lv., NM K3041 (do, Stn 379) ; 19°52' S, 158°40' E, 540-580 m, 1 dd (MUSORSTOM 5, Stn 338) ; 19°53' S, 158°38' E, 380-395 m, 1 lv., 2 dd (do, Stn 339) ; 19°53' S, 158°40' E, 410 m, 2 dd (do, Stn 362) ; 19°53' S, 158°39' E, 400 m, 1 lv., 1 dd (do, Stn 372) ; 19°54' S, 158°38' E, 355 m, 1 lv., 2 dd (do, Stn 378). Collected by P. BOUCHET, B. MÉTIVIER and B. RICHER DE FORGES in October, 1986, on board R. V. "Coriolis". — **Northern New Caledonia** ("Grand Passage" between Belep Is. and Surprise Atoll) : 18°55' S, 163°22' E, 465 m, 2 lv. (MUSORSTOM 4, Stn 195) ; 18°55' S, 163°24' E, 450 m, 29 lv. and dd, 1 dd, NM K3042/T27 (do, Stn 196) ; 18°56' S, 163°23' E, 415 m, 3 dd (do, Stn 193). Collected in September, 1985, by P. BOUCHET and B. RICHER DE FORGES on board R. V. "Vauban". — **Southern New Caledonia** : 22°47' S, 167°14' E, 440-450 m, 3 lv., 21 dd (BIOCAL, Stn 44) ; 22°47' S, 167°10' E, 375-380 m, 3 dd (MUSORSTOM 4, Stn 212) ; 22°54' S, 167°14' E, 425-440 m, 1 lv., 1 dd (do, Stn 214) ; 22°56' S, 167°17' E, 485-520 m, 1 lv. (do, Stn 215) ; 22°46' S, 167°20' E, 300 m, 8 dd (do, Stn 227) ; 22°51' S, 167°13' E, 445-460 m, 10 dd (do, Stn 229) ; 22°52' S, 167°12' E, 390-420 m, 12 lv., 4 dd (do, Stn 230) ; 22°56' S, 167°16' E, 500 m, 1 lv., 2 dd (SMIB 1, Stn 7) ; 22°55' S, 167°15' E, 450 m, 1 lv. (do, Stn 9) ; 22°53' S, 167°13' E, 438-444 m, 2 dd (SMIB 2, Stn 1) ; 22°56' S, 167°15' E, 412-428 m, 10 lv., 28 dd (SMIB 2, Stn 3) ; 22°56' S, 167°16' E, 437 m, 4 lv. (SMIB 3, Stn 25) ; 22°55' S, 167°16' E, 457 m, 1 dd (do, Stn 27) ; 22°47' S, 167°12' E, 405 m, 1 lv., 2 dd (do, Stn 29). Collected in 1985-87 by G. BARGIBANT, P. BOUCHET, J. L. MENOU, B. MÉTIVIER, B. RICHER DE FORGES and P. TIRARD on board R. V. "Jean-Charcot" and R. V. "Vauban".

NOTES : Three local forms are present, which may be diagnosed as follows :

(a) *Typical (southern New Caledonia) form* : Shell relatively narrow and high-spired (b/l 0.38-0.42, a/l 0.43-0.49, spire angle 29°-45°) ; vividly and zonately patterned, spire strongly marked with purple, median area light greyish-brown with paler ancillid band, subsutural region and posterior fasciolar band deep brownish-orange, aperture pink ; columella pleats 6-7, dividing towards interior ; maximum length about 34 mm.

(b) *Chesterfield form* : Shell relatively broad and more biconic, with a somewhat lower, distinctly orthoconic spire (b/l 0.43-0.47, a/l 0.43-0.51, spire angle 44°-52°) and more tumid posterior fasciolar band than in (a) ; coloration drab and rather uniform pinkish-brown, spire only slightly tinged with purple, median area and ancillid band drab brown with light brownish-orange subsutural region and posterior fasciolar band, aperture pinkish-brown ; columella pleats 4-7, simple ; maximum length about 34 mm.

(c) *Northern New Caledonian form* : Small (maximum length about 28 mm), shape as in typical form but coloration and other characters as in Chesterfield form.

A. aureomarginata belongs to the *Amalda hilgendorfi* complex of species, whose shared characters include narrow shell proportions and a high spire, which is covered by only a thin, smooth layer of primary callus, which masks but does not entirely fill the suture and leaves the apex (and occasionally even the median area of the later whorls) exposed; secondary callus forms at most a relatively thin pad, smooth except for microshagreen sculpture; the operculum is narrowly elliptical and usually fills the aperture. Members of this complex resemble *Amalda* s.s. of the western Atlantic, in which, however, the uncalled median area of the body whorl is restricted to a narrow posterior band, and the operculum is small and rhomboidal. Recent species, allied to *A. aureomarginata*, are *Ancillaria hilgendorfi* von Martens, 1897, *A. rubiginosa* Swainson, 1825 (but not of modern authors), and *A. vernedei* Sowerby, 1859. These are all much larger species than *aureomarginata*, and differ in coloration and in general shape.

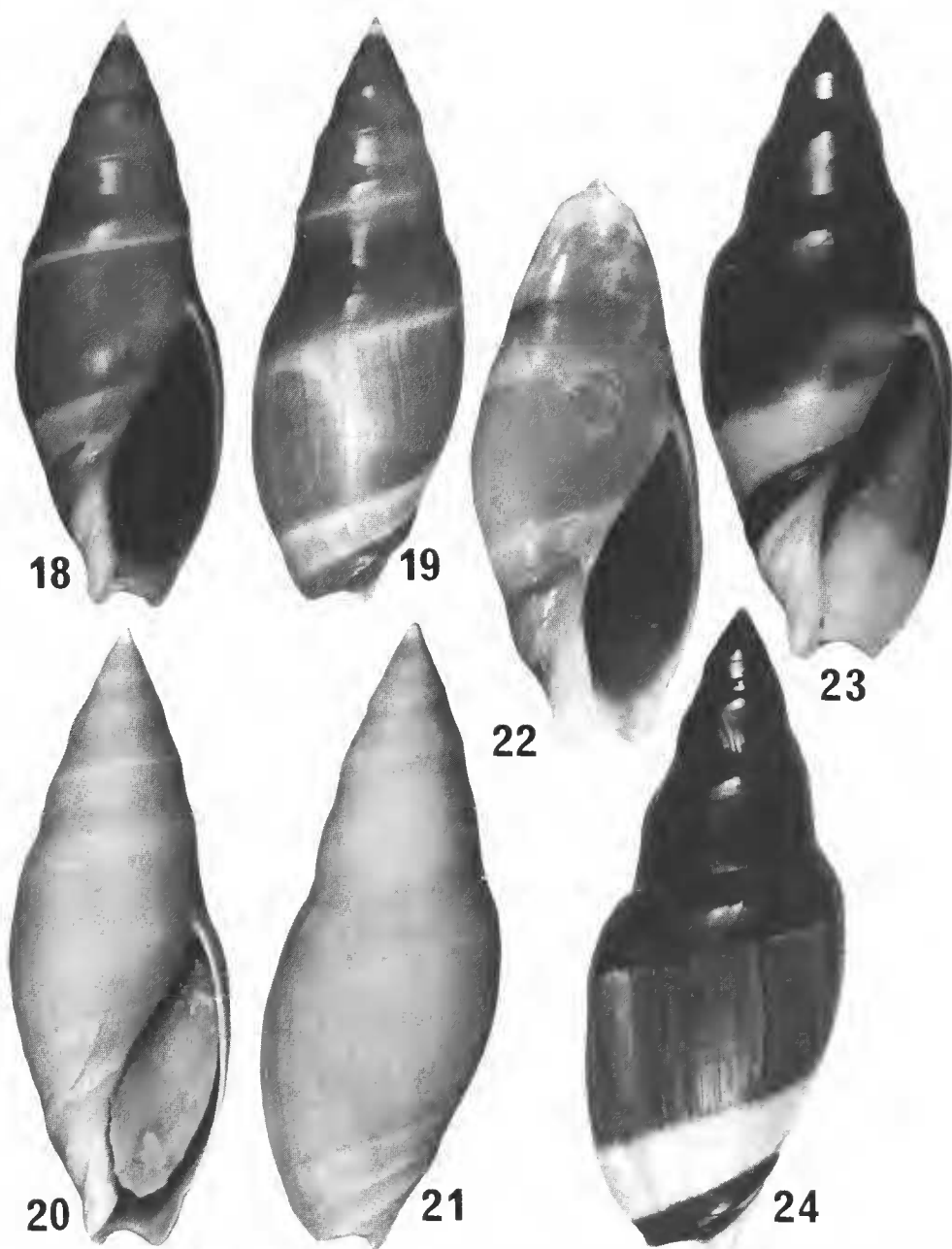
ETYMOLOGY : *aureus* (gold) + *marginatus* (bordered), L.

***Amalda hilgendorfi richeri* subsp. n.**

(Figs. 18-24, 46-47, 50, 57)

DIAGNOSIS : Shell fusiform with high, acuminate spire, thinly calloused and distinctly impressed at sutures, but sometimes rather pupiform with fairly low, heavily calloused, strongly cyrtocoid spire, exposing a mammillate apex; b/l 0.37-0.41, a/l 0.46-0.55, spire angle 32°-38°; protoconch and 1st teleoconch whorl exposed, secondary callus a thin glaze; columella pillar with 2-7 pleats, outermost one sunken below level of others, inner ones usually weak to obsolete; ancillid groove fairly shallow (rarely obsolete), commencing at about mid-parietal level, tooth distinct but obtuse; median area of body whorl light pinkish-brown, protoconch, ancillid groove (sometimes entire band), anterior fasciolar band and a line bordering posterior callus pale, spire callus and posterior fasciolar band brownish-orange; occasionally dark reddish-brown with ancillid band, lower edge of median area and anterior fasciolar band contrasting whitish; protoconch bluntly conical, last whorl concave-sided, breadth approximately 1.9 mm. Attains 76 mm.

DESCRIPTION : Shell fusiform with relatively narrow base b/l 0.37-0.41; body whorl typically slightly flattened above periphery, evenly convex on right side, outer lip slightly drawn in at site of labral tooth, greatest width of body whorl slightly posterior to median; aperture narrow, a/l 0.46-0.55. Spire high and slightly cyrtocoid, apex acute, angle 32°-38°, primary callus thin and enshrouding all except protoconch and 1st teleoconch whorl, distinctly impressed at sutures, spire whorls with slight keel near midwhorl; surface of callus glossy and very finely microshagreened, without traces of spiral sculpture; secondary callus sometimes absent but usually a thin glaze, that extends to antepenultimate suture and around dorsal side of spire. Aperture lanceolate, bluntly angled posteriorly, widest medially; parietal callus a thin glaze or even absent; outer lip shallowly concave and very slightly prosocline in side-view, with a distinct but obtuse basal denticle; siphonal notch moderately deep, asymmetrically U-shaped. Columella pillar moderately twisted, its termination acute, with a shallow basal notch; pleats 2-5 (rarely 7), outermost one somewhat recessed, separated from the more prominent 2nd pleat by a slightly deeper groove; microshagreen sculpture very fine, slightly coarser in grooves. Anterior fasciolar groove shallow, its band more or less flattened; posterior fasciolar band typically with a strong postmedian ridge; border of anterior fasciolar



FIGS. 18-24. — *Amalda hilgendorfi richeri* subsp. n. : 18-19, holotype, MUSORSTOM 4, Stn 179, 18°57' S, 163°14' E, 475 m, length 66.9 mm; 20-21, same specimen coated to enhance sculptural details; 22, pupiform morph, SMIB 1, Stn 2, 22°52' S, 167°13' E, 415 m, length 46.4 mm; 23-24, paratype, chocolate-brown colour variant, MUSORSTOM 5, Stn 320, 22°25' S, 159°13' E, 315 m, length 75.1 mm.

band barely raised above edge of posterior one, and margin of posterior band usually forming a slight ridge at edge of ancillid band; ancillid groove moderately shallow, commencing at about mid-parietal level, ancillid band not depressed. Median zone and ancillid band with growth-lines, becoming coarse behind outer lip (where there is a thin callus deposit) and behind secondary callus pad; traces of very fine scratch-like spiral striae. Maximum number of teleoconch whorls about 5.5.

Coloration : Median area of body whorl moderate orange to light yellowish-brown, ancillid groove (sometimes also entire ancillid band) and a line bordering subsutural callus paler; subsutural callus on body whorl moderate orange-yellow, darkening to moderate or strong orange dorsally, median part of spire sometimes tinged with dark yellowish-pink, protoconch and columella pillar white; posterior fasciolar band moderate orange, aperture moderate yellowish-pink, with a pale line at level of ancillid groove.

Protoconch (figs. 46-47) bluntly conical, 1st whorl rounded and tilted; limits ill-defined, approximately 2 whorls, last one concave-sided, breadth about 1.9 mm.

Dimensions : 66.9 × 24.4 mm (holotype). Attains 76.2 mm in length.

Operculum as in *A. montrouzieri* but slightly smaller than aperture.

Radula (figs. 50, 57) : Median cusp of rachidian plate much weaker than side cusps, without accessory denticles.

DISTRIBUTION : Both northern and southern New Caledonia, as well as Chesterfield and Nova Banks, living in 450-600 m, with one live record from 315 m.

TYPE MATERIAL : Holotype in MNHN, Northern New Caledonia (between Belep Is and Surprise Atoll), 18°57' S, 163°14' E, 475 m, lv. (MUSORSTOM 4, Stn 179). Collected by P. BOUCHET and RICHER DE FORGES on board R. V. "Vauban" in September, 1985. Paratypes : Northern New Caledonia (all MUSORSTOM 4) : 18°57' S, 163°13' E, 480 m, 1 dd, 3 lv. juv., MNHN, 1 dd, NM K3039/T24 (Stn 170); 18°51' S, 163°21' E, 550 m, intermediates between typical and pupiform morph, 7 dd (Stn 197); 18°54' S, 163°19' E, 525 m, 1 dd (Stn 156); 18°35' S, 163°10' E, 525 m, 2 lv. (Stn 162); 18°53' S, 163°22' E, 545 m, 3 lv., 1 dd (Stn 194); 18°56' S, 163°14' E, 490 m, 1 lv., 1 dd (Stn 201). Collection data as under holotype.

OTHER MATERIAL : **Nova Bank** : 22°07' S, 159°25' E, 487-610 m, 1 dd, dark form (MUSORSTOM 5, Stn 301); 22°10' S, 159°26' E, 385-420 m, 1 dd, dark form (do, Stn 304); 22°25' S, 159°24' E, 330 m, 1 dd (do, Stn 316); 22°25' S, 159°13' E, 315 m, 1 lv., dark form (do, Stn 320). — **Chesterfield** : 19°38' S, 158°44' E, 555-570 m, 1 lv. (MUSORSTOM 5, Stn 380). Collected by P. BOUCHET, B. MÉTIVIER and B. RICHER DE FORGES on board R. V. "Coriolis", October, 1986. — **Northern Norfolk Ridge** : 24°40' S, 168°38' E, 650 m, 1 dd (CHALCAL 2, Stn DW 74); 24°39' S, 168°40' E, 600 m, 2 lv., 3 dd (do, Stn DW 75); 24°45' S, 168°08' E, 233 m, 1 dd, dark form (SMIB 3, Stn DW 8). Collected by P. BOUCHET, B. MÉTIVIER and B. RICHER DE FORGES on board R. V. "Coriolis" and R. V. "Vauban" in October, 1986 and May, 1987. — **Southern New Caledonia** ("pupiform" shells) : 22°50' S, 167°16' E, 480-505 m, 2 dd ("Vauban" 1978-79, Stn 23); 22°53' S, 167°17' E, 570-610 m, 5 lv., 1 dd, MNHN, 1 dd, NMK 3038/T23 (BIOCAL, Stn 46); 22°57' S, 167°30' E, 545-560 m, 2 dd (MUSORSTOM 4, Stn 223); 22°51' S, 167°13' E, 445-460 m, 2 worn (MUSORSTOM 4, Stn 229); 22°52' S, 167°13' E, 415 m, 2 dd (SMIB 1, Stn 2); 22°59' S, 167°19' E, 525 m, 1 lv. (SMIB 3, Stn 21); 24°45' S, 168°08' E, 233 m, 1 worn shell (SMIB 3, Stn 8); 23°03' S, 167°19' E, 503 m, 1 lv., 1 dd (SMIB 3, Stn 22). Collected by G. BARGIBANT, P. BOUCHET, B. MÉTIVIER, P. TIRARD and B. RICHER DE FORGES on board R. V. "Jean-Charcot" and R. V. "Vauban" in 1978 and 1985-87.

NOTES : This taxon is one the most variable members of the Ancillinae, its very different extremes in shell-form being linked by intermediate examples. Although it is typically slender

and fusiform with an acuminate, thinly calloused spire, a peculiar pupiform morph occurs in which the spire is rendered strongly cyrtoconoid by a very thick primary callus, exposing the apex which is conspicuously mammilliform. This variant is very local in distribution, being restricted to an area of about 400 km² to the S/SW of the Isle of Pines. The typical form also ranges into this area on the northern part of Norfolk Ridge.

In its typical state, *richeri* very closely resembles *Amalda hilgendorfi* (von Martens, 1897) of Japan and the South China Sea, and is here accorded subspecific status. *A. h. richeri* differs from *A. hilgendorfi hilgendorfi* in its somewhat broader, more fusiform shell (b/l 0.37-0.41 against 0.32-0.37) and in the presence of a slight keel on the spire whorls. Pupiform individuals are unknown in the nominate subspecies; these show a superficial resemblance to the Japanese *Amalda hinomotoensis* (Yokoyama, 1922), which differs in its thicker secondary callus, non-exposed protoconch, narrower ancillid band and in other details.

Specimens of a very dark population variant were dredged on Nova Bank (together with a pale example), and once in southern New Caledonia (SMIB 3, Stn 8). Coloration : entire exterior dark brownish, except for protoconch, ancillid band and anterior edge of median zone which are white, and anterior fasciolar band which is yellowish-white; rest of median area moderate yellowish-brown, primary callus deep brown, secondary callus dark reddish-brown, posterior fasciolar band strong brown. The largest specimen, measuring 75.1 × 29.5 mm, is atypical not only in colour but in lacking a labral tooth, the ancillid groove being feeble. This individual (figs. 23-24) shows a slight resemblance to *Amalda rubiginosa* (Swainson, 1825), which differs, *inter alia*, in its much larger protoconch (diameter about 2.5 mm). (*A. rubiginosa* is a rare species whose true habitat remains to be established, although modern authors have confused it with the very different *Amalda albocallosa* (Lischke, 1873) of Japan.)

A. h. richeri is the deepest-living ancilline known from New Caledonia, occurring at depths of between 450 and 600 m. *A. h. hilgendorfi* is a shallower-water subspecies, reported from 150-300 m in Japan. A third, undescribed subspecies occurs north of Madagascar in 300-500 m (MNHN : ORSTOM, ex A. CROSNIER).

Although VON MARTENS (1904) suggested that *hilgendorfi* might be a member of his genus *Turrancilla*, the non-terminal nucleus of the operculum shows it to be an *Amalda*. It belongs to the same complex of species as *A. aureomarginata* n. sp.

ETYMOLOGY : Named in honour of Dr B. RICHER DE FORGES, leader of the expeditions which collected this species.

***Amalda fuscolingua* sp. n.**

(Figs. 25-28, 40-41, 54)

DIAGNOSIS : Shell ovate-fusiform, b/l 0.43-0.45, somewhat asymmetrical, body whorl somewhat swollen below suture, spire otherwise bluntly orthoconoid, angle 37°-49°, aperture relatively short, a/l 0.41-0.45 posteriorly truncated, spire enshrouded in moderately thick, smooth primary callus, exposing most of protoconch, secondary callus a fairly thin but well-defined linguiform pad on underside of spire; columella pillar with 3-6 pleats, all except the outer 2 weak, intervals irregularly but distinctly granular; ancillid groove very shallow, denticle very blunt to feeble. Light yellowish-brown, posterior fasciolar band and spire callus brownish-orange, secondary callus pad sometimes darker, spire usually with milky/chalky rays. Maximum length 57.1 mm.

DESCRIPTION : Shell ovate-fusiform with relatively broad base, b/l 0.43-0.45 ; body whorl evenly convex on right side, slightly flattened medially on left side, slightly swollen below suture, greatest width of body whorl more or less median ; aperture relatively short, a/l 0.41-0.45. Spire bluntly orthoconoid, but rendered coeloconoid by the swollen subsutural region, spire angle 37°-49° ; primary callus moderately thick and enshrouding entire spire, except for apex, and more or less obliterating suture ; surface of callus glossy, very finely and indistinctly microshagreened ; secondary callus forms a fairly thin but well-defined, linguiform pad on ventral side of spire, continuous with the parietal callus. Aperture somewhat lanceolate, truncated or broadly rounded posteriorly, widest more or less medially ; outer lip very slightly prosocline and barely concave in side-view, denticle very blunt to almost obsolete ; siphonal notch fairly deep, asymmetrically U-shaped. Columella pillar moderately twisted, its termination acute, with a rather deep basal notch ; pleats 3-6, all except the outer two weak, the outermost pleat rather angular, sunken below and separated from 2nd pleat by a wider, slightly deeper groove, intervals feebly and irregularly granular. Anterior fasciolar groove fairly wide and shallow, its band somewhat flattened ; posterior fasciolar band slightly convex to slightly concave ; border of anterior fasciolar band raised slightly above edge of posterior one, and margin of posterior band raised slightly above ancillid band ; ancillid groove very shallow, its band not depressed. Median zone and ancillid band with fine growth-lines (becoming coarse behind lip) and traces of scratch-like spiral striae. Number of teleoconch whorls about 4.

Coloration : Median area of body whorl [near] light yellowish-brown to [near] light orange, most of primary callus and posterior fasciolar band brownish-orange to strong brown, spire usually with oblique milky/chalky growth marks, anterior fasciolar band and apex paler, secondary callus pad sometimes darker, aperture moderate orange.

Protoconch (figs. 40-41) domed, 1st whorl rounded and depressed, base of second whorl enveloped in callus ; limit not defined.

Dimensions : 34.8 × 15.0 mm (holotype). Attains 57.1 mm length.

Operculum as in *A. montrouzieri* but anterior end less rounded.

Radula (fig. 54) : Rachidian with its side cusps somewhat longer than the median cusp ; outer (and to a lesser extent inner) edges of bases of side cusps serrated by a variable number of small denticles (2-6, occasionally absent on individual plates) ; lateral plates typical of genus, with large base, shaft usually with small serrations on concave edge ; 76 rows of teeth.

DISTRIBUTION : Off southern New Caledonia in about 300-450 m.

TYPE MATERIAL : Holotype in MNHN, 22°56' S, 167°15' E, 412-428 m, lv. (SMIB 2, Stn 3). Paratypes : 22°56' S, 167°15' E, 412-428 m, 4 lv., 10 dd, MNHN, 1 lv., NM K3037/T22 (SMIB 2, Stn 3) ; 22°47' S, 167°22' E, 390 m, 12 dd (MUSORSTOM 4, Stn 226) ; 22°43' S, 167°16' E, 300 m, 5 dd (SMIB 1, Stn 6) ; 22°46' S, 167°20' E, 300 m, 3 lv., 27 dd (MUSORSTOM 4, Stn 227).

OTHER MATERIAL : 22°49' S, 167°12' E, 390-395 m, 2 lv., 4 dd ("Vauban" 1978-79, Stn 15) ; 22°48' S, 167°09' E, 355-360 m, dd juv. (do, Stn 24) ; 22°08' S, 167°04' E, 230-260 m, 5 dd (do, Stn 42) ; 23°46' S, 167°13' E, 380 m, 1 dd (BIOCAL, Stn CP 42) ; 22°44' S, 167°09' E, 340-345 m, 2 dd (MUSORSTOM 4, Stn 210) ; 22°47' S, 167°10' E, 375-380 m, 5 dd (do, Stn 212) ; 22°58' S, 167°33' E, 410-440 m, 1 lv. (do, Stn 222) ; 22°15' S, 167°08' E, 350-365 m, 9 dd (do, Stn 234) ; 22°47' S, 167°12' E, 394 m, 1 lv., 1 dd (SMIB 3, Stn 28) ; 22°47' S, 167°12' E, 405 m, 1 lv., 1 dd (SMIB 3, Stn 29) ; 22°58' S, 167°22' E, 648 m, 1 lv. (SMIB 3, Stn 30) ; 22°42' S, 167°11' E, 318-330 m, 2 dd (Programme LAGON, Stn 418-419) ; 22°53' S, 167°13' E, 438-444 m, 3 lv., 24 dd (SMIB 2, Stn 1).

All material was collected in 1985-87 by G. BARGIBANT, P. BOUCHET, J. L. MENOU, B. MÉTIVIER, B. RICHER DE FORGES and P. TIRARD on board R. V. "Jean-Charcot" and R. V. "Vauban".

NOTES : *A. fuscolingua* inhabits a restricted area off southern New Caledonia, where it occupies much the same depth-range (mostly 300-450 m) as *A. aureomarginata* (350-500 m). *A. hilgendorfi richeri* inhabits deeper water (450-600 m) in the same area.

In a preserved specimen no trace of tentacles or eyes are evident, and the penis terminates in a long appendage (only slightly thinner than the shaft) whose tip is shallowly bifurcate.

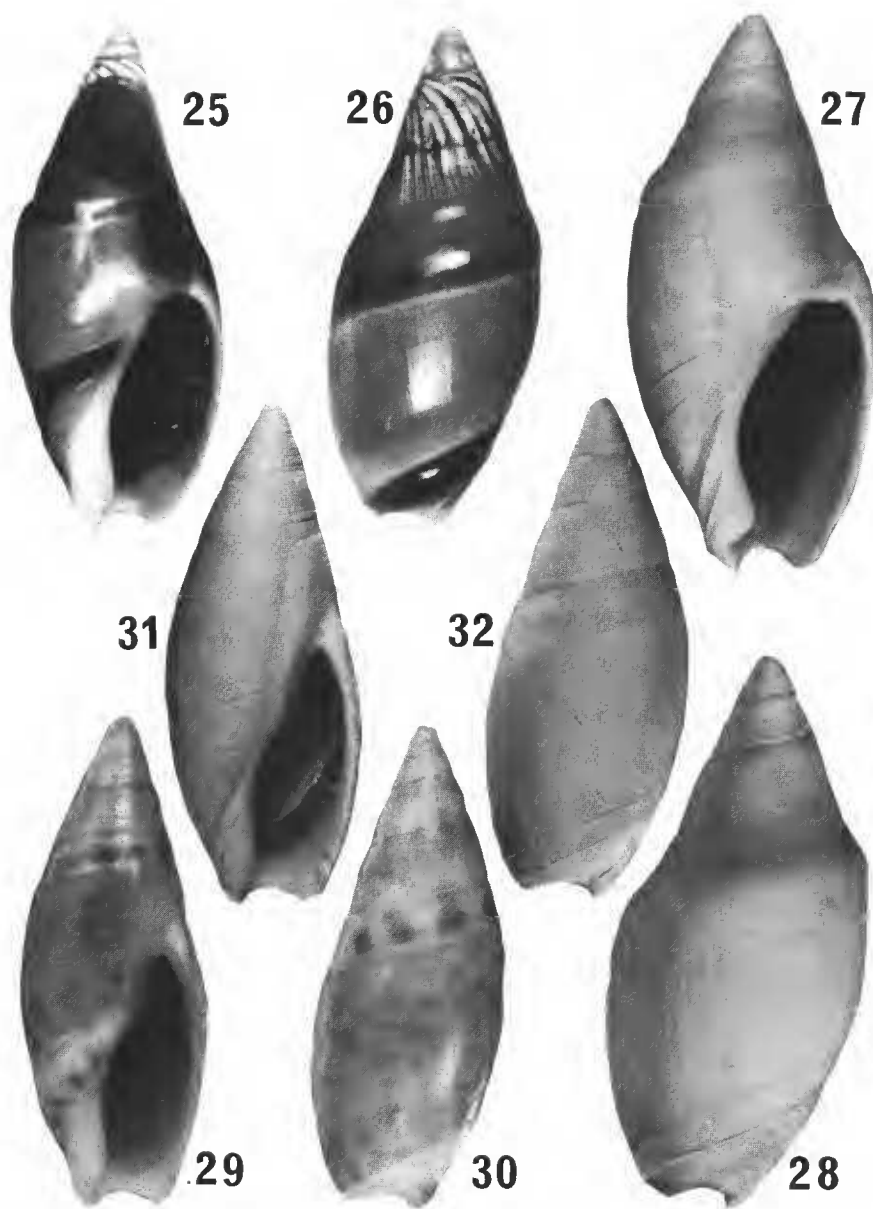
ETYMOLOGY : *fuscus* (brown) + *lingua* (tongue), L., alluding to the appearance of the secondary callus pad.

***Amalda bellonarum* sp. n.**

(Figs. 29-32, 48-49)

DIAGNOSIS : Shell oblong-ovate-fusiform, b/l 0.36-0.40, with a fairly broad base and high, somewhat papilliform spire, a/l 0.49-0.56, spire angle 28°-36°, aperture relatively large; spire whorls flattened, primary spire callus a thin glaze, not masking sutures or underlying colour pattern, bearing weak to strong spiral ridges; secondary callus a rather thin, linguiform pad; ancillid groove and denticle well developed; columella with 3-4 ridges. Colour greyish-white, callus deposits more opaque white, with a line of orange spots below suture and another on anterior fasciolar band, median area with pale orange spots, a series above and below ancillid groove aligned; protoconch breadth 1.6 mm. Maximum length 15.1 mm.

DESCRIPTION : Shell oblong-ovate-fusiform with relatively broad base, b/l 0.36-0.40; sides of body whorl fairly evenly convex, slightly flattened below suture, greatest width more or less median; aperture relatively large a/l 0.49-0.56. Spire high, apex somewhat papilliform, angle 28°-36° (23° in one aberrant shell); spire whorls flattened; primary callus a rather thin glaze through which is faintly visible the subsutural colour-pattern, and which exposes the protoconch; primary callus slightly impressed at sutures, its surface glossy but exceedingly finely microshagreened, and bearing feeble to strong spiral ridges between subsutural callus and lower suture (3-6 ridges on 1st whorl, 6-7 on penultimate one); parietal callus continues up right side of undersurface to form a narrow, fairly thin linguiform pad of secondary callus that almost reaches the antepenultimate suture. Aperture more or less lanceolate, roundedly acute posteriorly, curved in parietal region, widest slightly anterior to median; outer lip very slightly prosocline and almost straight in side-view, with a sharp basal denticle; siphonal notch fairly shallow, asymmetrically U-shaped. Columella pillar moderately twisted, its termination acute, with a fairly deep basal notch; pleats 3-4, outermost pleat strongest separated from others by a slightly wider groove, microshagreen sculpture very fine, slightly coarser in grooves. Anterior fasciolar groove wide and fairly deep, distinctly microshagreened; anterior and posterior fasciolar bands slightly convex; border of anterior fasciolar band raised above edge of posterior one, and margin of posterior band raised slightly above ancillid band; ancillid groove rather deep, its band not depressed. Median zone and ancillid band with rather coarse growth-lines (particularly below suture) and faint traces of scratch-like spiral striae. Teleoconch whorls number about 3.5.



FIGS. 25-28. — *Amalda fuscolingua* sp. n. : 25-26, holotype, N. O. "Vauban", SMIB 2, Stn 3, 22°56' S, 167°15' E, 412-428 m, length 34.8 mm ; 27-28, specimen coated to enhance sculptural details, MUSORSTOM 4, Stn 226, 22°47' S, 167°22' E, 390 m, length 35.7 mm.

FIGS. 29-32. — *Amalda bellonarum* sp. n. : 29-30, holotype, CHALCAL 1, Stn D56, 21°25' S, 159°09' E, 60 m, length 15.0 mm ; 31-32, same specimen coated.

Ground colour [greyish-] white, subsutural and basal callus deposits more opaque white, with a zone of moderate orange spots below suture and another on anterior fasciolar band, median area with random, rather diffuse spots of pale orange (sometimes joining up to form occasional strigations) and aligned pairs of slightly darker spots on either side of ancillid groove; protoconch, columella pillar, parietal callus and aperture white.

Protoconch (figs. 48-49) roundedly conical, 1st whorl somewhat tilted, evidently nearly 2 whorls, breadth 1.6 mm.

Dimensions : 15.0 × 5.9 mm (holotype), 15.1 × 5.8 mm (largest paratype).

Operculum as in *A. montrouzieri* but very thin and transparent yellowish.

DISTRIBUTION : Known only from the Chesterfield-Bellona plateau, Coral Sea, New Caledonia, in about 45-240 m.

TYPE MATERIAL : Holotype in MNHN, 21°25' S, 159°09' E, 60 m, dd (CHALCAL, Stn D56). Paratypes : 19°33' S, 158°30' E, 230 m, 1 dd (CHALCAL, Stn D31); 19°11' S, 158°34' E, 48 m, 1 lv., NM K3043/T28 (CHALCAL, Stn D26); 19°45' S, 158°26' E, 210 m, 1 dd (CHALCAL, Stn D35); 19°12' S, 158°56' E, 44 m, 1 dd (CHALCAL, Stn D17); 19°54' S, 158°46' E, 50 m, 1 dd (CHALCAL, Stn D37); 19°45' S, 158°26' E, 205 m, 1 lv., 2 dd (CHALCAL, Stn D33). All material dredged by B. RICHER DE FORGES on board R. V. "Coriolis" in July, 1984.

OTHER MATERIAL : 19°27' S, 158°35' E, 246 m, 1 dd (CHALCAL 1, Stn D14); 19°24' S, 158°32' E, 51 m, 1 dd (do, Stn D28); 21°20' S, 158°55' E, 60 m, 1 dd (do, Stn D53). Collected on same expedition as types.

NOTES : *Amalda bellonarum* closely resembles (in miniature) its probable sister-species *A. rosea* (Macpherson, 1956) of the Queensland and New South Wales littoral. Most aspects of shape, and details of columella pillar and callus formation agree, and the operculum is similarly transparent yellowish. In *A. rosea* the median area of the body whorl lacks the spots present there in *A. bellonarum*, but other differences are all of degree : adult size (15 mm) is smaller than in *rosea* (24 mm), as are protoconch dimensions (breadth 1.6 mm, against 1.9 mm), the spire whorls are distinctly less convex and the columella pillar is narrower than in *rosea*. Despite this close morphological resemblance between the two, the ranges of *bellonarum* and *rosea* are separated by an abyssal barrier, and full species rank is evident. In colour pattern, size and general proportions there is also some resemblance to the recently described *A. albanyensis* Ninomiya, 1987, from S. W. Australia; material of *A. bellonarum* has been compared with the holotype and a paratype of *albanyensis* (NSMT Mo 64212, 64212a) and also with two topotypes (NM J6524). *A. albanyensis* lacks spiral grooves on the spire and has a violet columella pillar and brown apex (these are both white in *bellonarum*).

Amalda rosea, together with a number of similar Australian species, is generally referred to subgenus *Alocospira*, but probably belongs (with *A. bellonarum*) to an unnamed group, characterised by a thinly calloused spire, feebly developed secondary callus pad, and a distinct colour-pattern of brown spots or streaks. Also to be grouped here are *A. booleyi* (Melvill & Sykes, 1896) from the Andaman Islands. *A. tindalli* (Melvill, 1898) from off southern India, *A. roscoei* Kilburn, 1975, from Mozambique, and several South African species such as *A. obesa* (Sowerby, 1859), *A. jenneri* Kilburn, 1977, and *A. lemaitrei* Kilburn, 1977.

ETYMOLOGY : Named after the Chesterfield-Bellona plateau, to which it is apparently endemic.

***Amalda coriolis* sp. n.**

(Figs. 33-37, 42-43, 58)

DIAGNOSIS : Shell biconic-ovate, b/l 0.43-0.51, with a slight, angular shoulder on body whorl, a narrow base and high, acutely conical spire, a/l 0.44-0.50, spire angle 40°-58°; primary spire callus enshrouding all except first 1-1.5 protoconch whorls, with faint spiral grooves, secondary callus pad thick; ancillid groove deep, denticle vestigial; columella with 3-4 non-bifid ridges; growth lines coarse behind lip. Colour yellowish-buff to brownish-orange, posterior fasciolar band and upper part of spire (excluding apex) deep reddish-orange, rest of spire callus white, dorsally marked shoulder with a brownish-orange band; ancillid groove encompassed by a white line; entire shell occasionally uniform white. Maximum length 48.9 mm.

DESCRIPTION : Shell biconic-ovate with relatively narrow base, b/l 0.43-0.51; body whorl with a slight, angulate shoulder below suture, evenly convex on right side, except above shoulder where slightly concave, outer lip drawn in at site of labral tooth, greatest width of body whorl slightly posterior to median; aperture moderately narrow, a/l 0.44-0.50. Spire moderately high and acutely conical, angle 40°-58°; primary callus fairly thick and enshrouding all whorls except first 1-1.5 protoconch whorls, not impressed at sutures; surface of callus glossy and very finely microshagreened, with faint traces of spiral grooves; secondary callus forming a thick, ovate pad on right side of spire that extends above antepenultimate suture. Aperture asymmetrically lanceolate, bluntly rounded posteriorly, widest slightly anterior to median; outer lip shallowly concave and very slightly prosocline in side-view, with only a vestigial basal denticle; siphonal notch shallow, asymmetrically U-shaped. Columella pillar moderately twisted, its termination acute, with a shallow basal notch; pleats 3-4, outermost one (which forms the columella margin) separated from 2nd pleat (which is the strongest) by a wider, slightly deeper groove; microshagreen sculpture very fine, slightly coarser in grooves. Anterior fasciolar groove wide and rather deep, its band barely convex; posterior fasciolar band slightly concave on either side of a feeble median ridge; border on anterior fasciolar band raised slightly above edge of posterior one, and margin of posterior band raised above ancillid band; ancillid groove moderately shallow, its band not depressed. Median zone and ancillid band with growth-lines, becoming coarse behind outer lip (where there is a thin callus deposit) and behind secondary callus pad; traces of scratch-like spiral striae. Number of teleoconch whorls indeterminate.

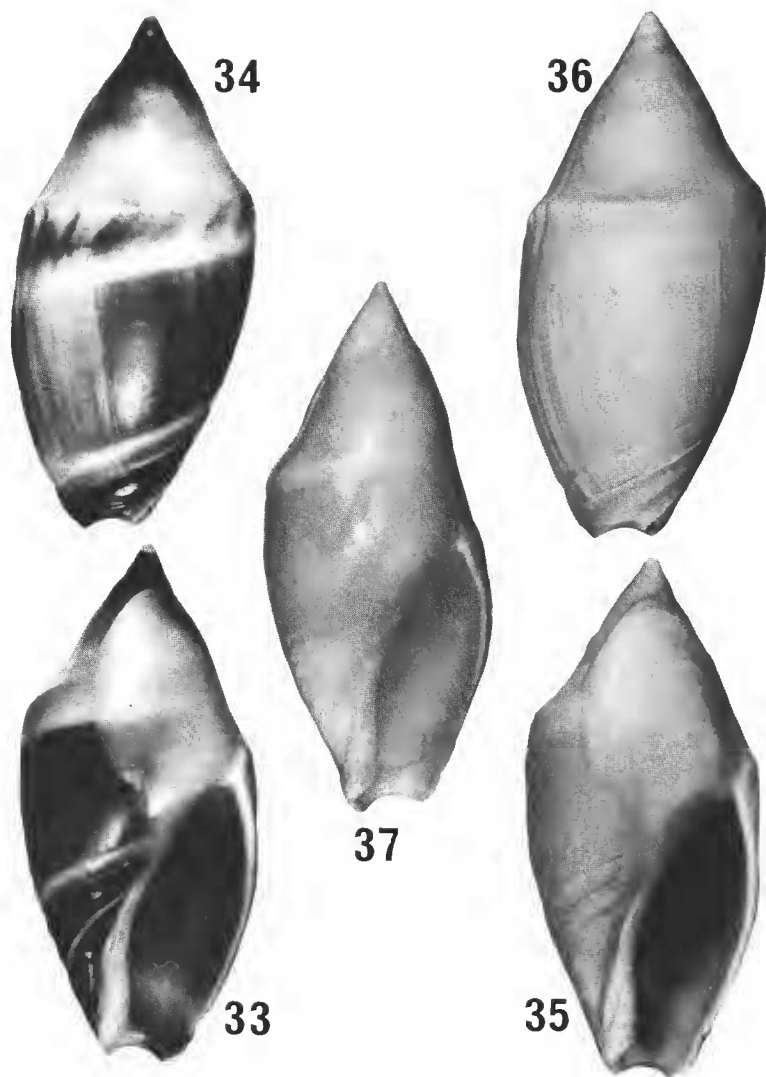
Coloration : Median area of body whorl pale orange-yellow to brownish-orange, ancillid groove straddled by a white line; posterior fasciolar band and upper part of spire vividly coloured with between deep orange and dark reddish-orange, apex pale; secondary callus, labial callus and lower part of primary spire callus white; body whorl marked dorsally below shoulder with a brownish-orange band, lip preceded by a milky callus wash; aperture usually moderate orange with a white band basally. Rarely uniform white.

Protoconch (figs. 42-43) narrowly domed, 1st whorl rounded and depressed; limits ill-defined.

Dimensions : 40.3 × 19.0 mm (holotype); 48.9 × 21.6 mm (largest paratype).

Operculum as in *A. montrouzieri*.

Radula (fig. 58) : Rachidian relatively short with rather long side-cusps and a slender,



FIGS. 33-37. — *Amalda coriolis* sp. n. : 33-34, holotype, MUSORSTOM 5, Stn 280, 24°10' S, 159°36' E, 270 m, length 40.3 mm ; 35-36, same specimen coated to enhance sculptural details ; 37, paratype, albinistic variant, MUSORSTOM 5, Stn 266, 25°20' S, 159°46' E, 240 m, length 40.2 mm.

markedly shorter median cusp, cutting edge external to side cusps strongly serrated by denticles, inner basal edges of side cusps weakly so.

DISTRIBUTION : Capel and Kelso Banks, Coral Sea, New Caledonia, in 150-300 m.

TYPE MATERIAL : Holotype in MNHN, Kelso Bank, 24°10' S, 159°36' E, 270 m, lv. (MUSORSTOM 5, Stn 280). Paratypes : Kelso Bank, 24°02' S, 159°38' E, 273 m, two MNHN, one NM K3036/T21, all lv. (MUSORSTOM 5, Stn 289) ; Capel Bank, 25°21' S, 159°45' E, 190-260 m, 4 lv., 36 dd (MUSORSTOM 5, Stn 265) ; Capel Bank, 25°20' S, 159°46' E, 240 m, two lv. (MUSORSTOM 5, Stn 266). All collected by P. BOUCHET, B. MÉTIVIER and B. RICHER DE FORGES.

OTHER MATERIAL : **Capel Bank** : 25°09' S, 159°55' E, 300-310 m, 1 lv., 2 dd (MUSORSTOM 5, Stn 252) ; 25°15' S, 159°55' E, 280-295 m, 1 lv., 2 dd (do, Stn 255) ; 25°33' S, 159°46' E, 300 m, 1 dd (do, Stn 258) ; 25°29' S, 159°44' E, 285 m, 3 dd (do, Stn 260) ; 25°27' S, 159°46' E, 300 m, 1 dd (do, Stn 261) ; 25°25' S, 159°47' E, 300 m, 1 dd (do, Stn 262) ; 25°21' S, 159°46' E, 150-225 m, 2 lv., 12 dd (do, Stn 263) ; 25°20' S, 159°46' E, 1 lv., 38 dd (do, Stn 266) ; 24°49' S, 159°34' E, 223 m, 1 lv., 2 dd (do, Stn 270) ; 24°47' S, 159°40' E, 285 m, 1 lv. (do, Stn 275) ; 24°49' S, 159°41' E, 258-269 m, 11 lv., 4 dd (do, Stn 276). — **Kelso Bank** : 24°11' S, 159°34' E, 272 m, 1 dd (MUSORSTOM 5, Stn 281) ; 24°10' S, 159°33' E, 225-230 m, 1 lv., 1 dd (do, Stn 284) ; 24°09' S, 159°34' E, 245-255 m, 1 lv., 3 dd (do, Stn 285). All material (including types) dredged in October 1986 by P. BOUCHET, B. MÉTIVIER and B. RICHER DE FORGES on board R. V. "Coriolis".

NOTES : The angular shoulder keel of *A. coriolis* distinguishes it from other New Caledonian species, and is characteristic of *Spinaspira* Olsson, 1956, a rather doubtful subgenus of *Amalda*. The only comparable species appears to be *A. raoulensis* (Powell, 1967) from the Kermadec Islands, which has a much lower spire and different coloration.

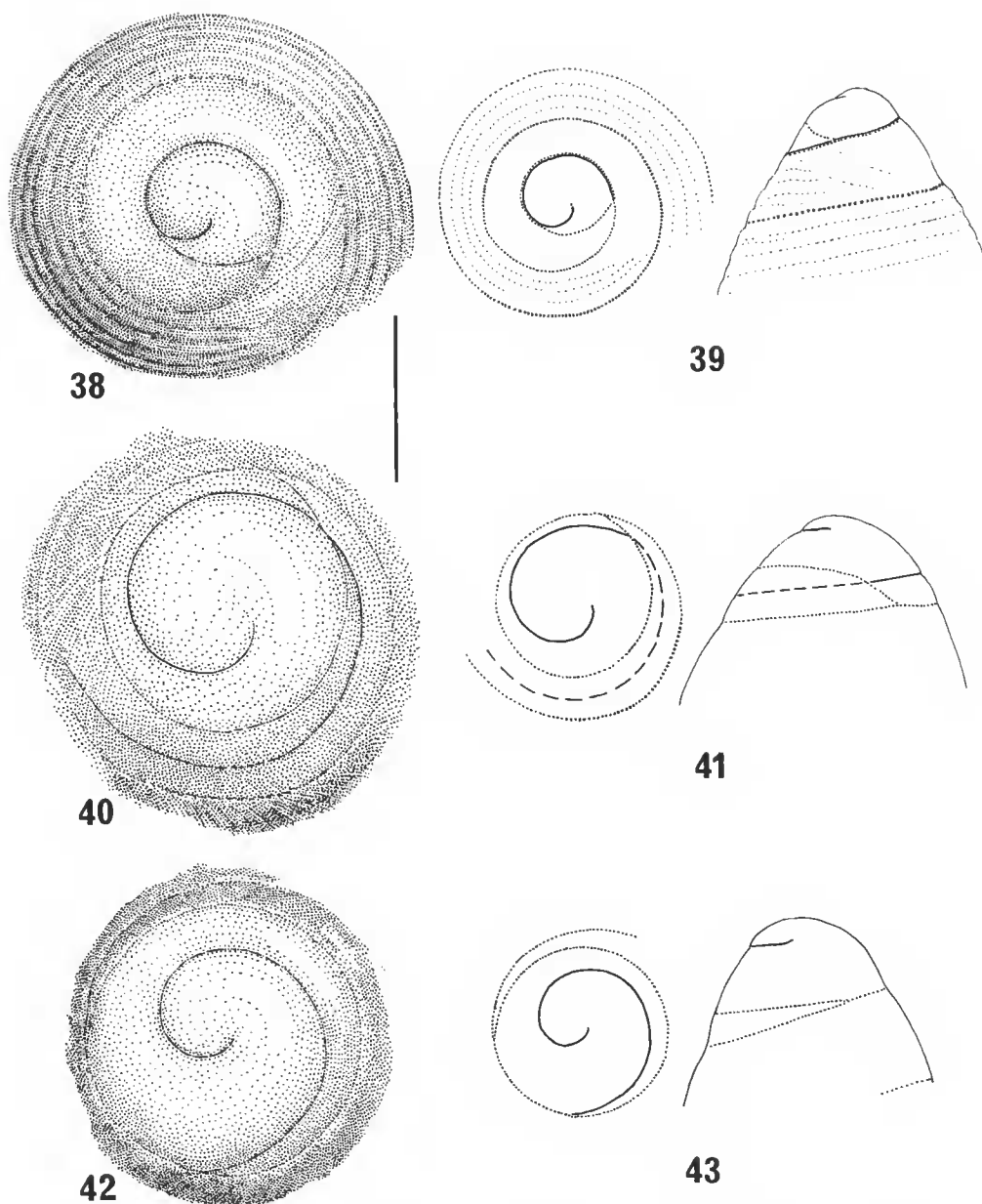
A. coriolis is known only from the Capel and Kelso Banks, and was taken neither on the Argo or Nova Banks, nor on the Chesterfield-Bellona plateau, although these were sampled at similar depths on the same expedition.

ETYMOLOGY : Named after the R. V. "Coriolis", from which all material was collected.

DISCUSSION

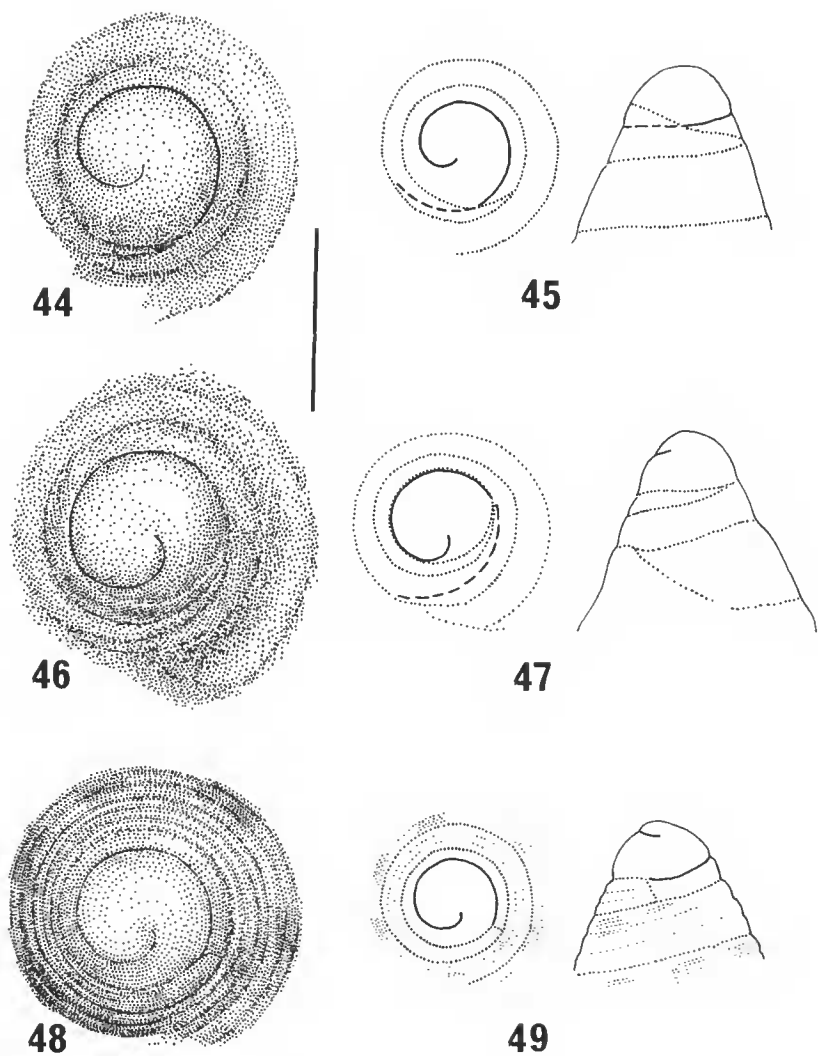
The areas to the east of New Caledonia (Vanuatu, Fiji, Tonga, etc.) have not been sampled at comparable depths so that it is not yet known whether the new species described herein are truly endemic to the New Caledonian region. Several exhibit relict distribution patterns. For example, *Amalda hilgendorfi richeri* is the New Caledonian representative of a species that has evolved into subspecies in the South China Sea and in the western Indian Ocean ; no evidence is yet available as to whether the ranges of these subspecies are disjunct or continuous. The group of species to which *A. coriolis* belongs is known primarily from the Miocene and Pliocene of New Zealand, with only two other Recent members (*A. raoulensis* (Powell, 1967) from the Kermadec and *A. trachyzonus* Kilburn, 1975, from the East London area of South Africa), clearly indicating present distribution patterns within this group to be relict. *A. bellonarum* appears to be a vicariant of the Queensland *A. rosea* (Macpherson, 1956).

The question of dispersal within the New Caledonian region remains speculative. All six species of New Caledonian Ancillinae possess a paucispiral protoconch, typical of members of



FIGS. 38-43. — Protoconchs of *Amalda montrouzieri*, *A. fuscolingua* and *A. coriolis* : 38-39, *A. montrouzieri*, southern New Caledonia, R. V. "Vauban", Stn 233, 22°35' S, 166°46' E, 30 m ; 40-41, *A. fuscolingua*, MUSORSTOM 4, Stn 227, 22°46' S, 167°20' E, 300 m ; 42-43, *A. coriolis*, MUSORSTOM 5, Stn 255, 25°15' S, 159°55' E, 280-295 m.

Scale-line (left-hand figures only) 1.0 mm. Figures 39, 41, 43, are diagrammatic; continuous line = exposed suture; interrupted line = suture visible by transparency; dotted line = limits of callus.



FIGS. 44-49. — Protoconchs of *Amalda aureomarginata*, *A. hilgendorfi richeri* and *A. bellonarum* : 44-45, *A. aureomarginata*, MUSORSTOM 4, Stn 195, 18°55' S, 163°22' E, 465 m ; 46-47, *A. h. richeri*, MUSORSTOM 4, Stn 170, 18°57' S, 163°13' E, 480 m ; 48-49, *A. bellonarum*, Chesterfield-Bellona plateau.

Scale-line (left-hand figures only) 1.0 mm. Same conventions as in figures 38-43.

the subfamily, in which non-planktotrophic larval development appears to be the rule. Despite this apparent constraint on larval dispersal, *A. h. richeri* and *A. aureomarginata* are known from isolated slope areas (Chesterfield-Bellona plateau and seamounts vs New Caledonian ridge) that are separated by abyssal depths. Even if the Lansdowne-Fairway Reef is assumed to be a stepping point between New Caledonia and Chesterfield, a minimum distance of ca. 250 km would remain to be traversed. Such a disjunct distribution would seem to indicate that some kind of dispersal is taking place in species such as *A. h. richeri* and *A. aureomarginata* (although conversely, marked geographical variation in *aureomarginata* is an indication that genetic exchange between its component populations must be infrequent). The same applies to *A. coriolis*, which is known from the plateau areas of two seamounts that are separated by a short (ca. 80 km) stretch of abyssal depths. Presumably the paucispiral protoconch in such cases reflects not holobenthic development with intracapsular metamorphosis, but lecithotrophic larval development with a short free-swimming larval phase. Even after metamorphosis, it is not impossible that swimming movements may aid in ancilline dispersal. Although not yet reported for members of the genus *Amalda*, swimming by means of propodial flapping has often been observed in the related genus *Ancillista* Iredale, 1936 (see WILSON, 1969).

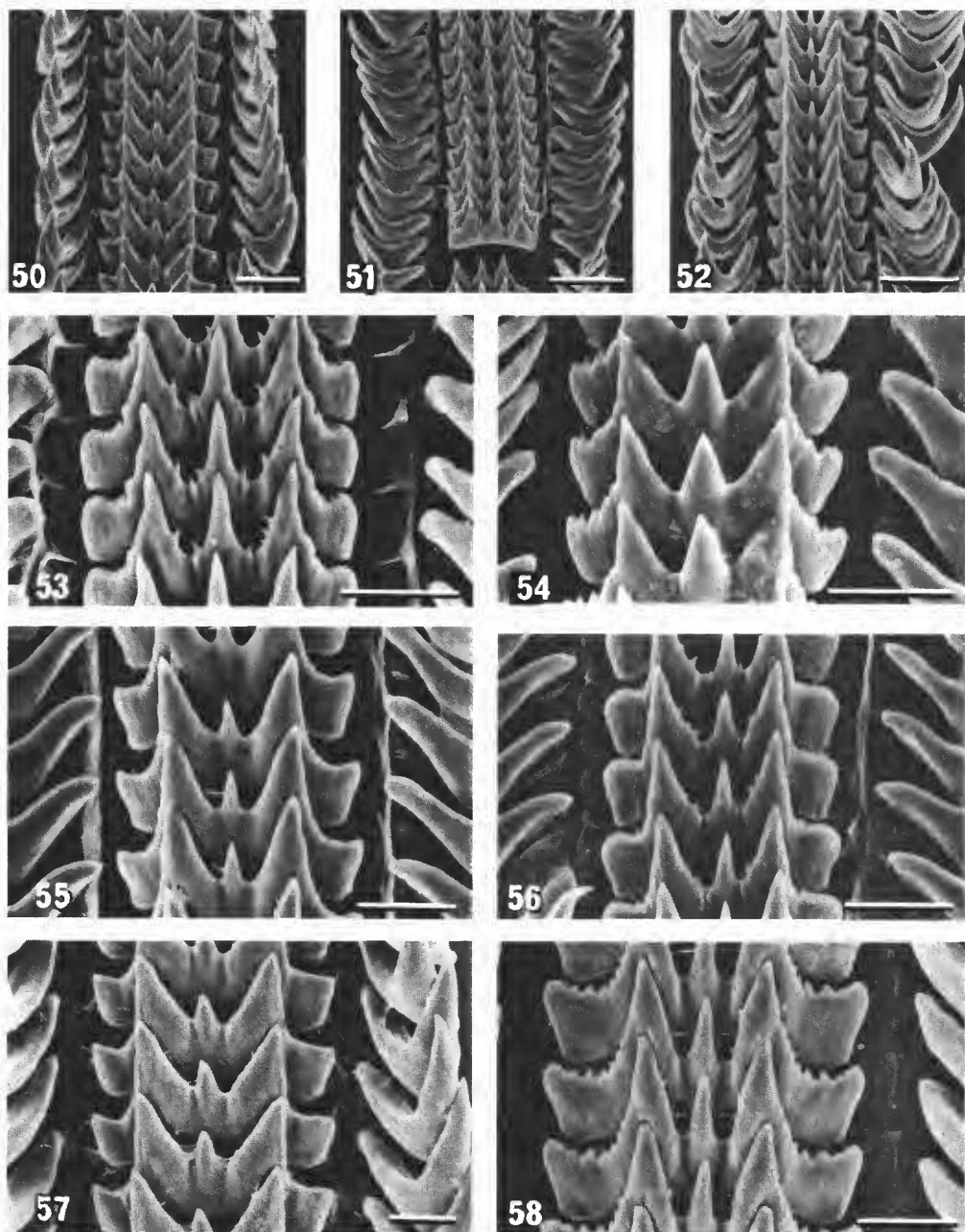
At coral reef depths, *A. montrouzieri* also occurs in discrete areas separated by deep water, and there are a number of extralimital records, indicating that in this species dispersal across apparent barriers may also take place, albeit infrequently. It is not inconceivable that during the large-scale movement of surface water caused by cyclones, juvenile and newly hatched individuals of *Amalda* species could be transported passively (perhaps aiding flotation by planing and propodial swimming movements) over open expanses of water.

Abbreviations

a/l	= ratio of aperture length (measured along shell axis) to total length.
b/l	= ratio of breadth to length.
BM(NH)	= British Museum (Natural History).
dd	= dead (empty) shell(s).
IRSN	= Institut Royal des Sciences Naturelle de Belgique.
lv.	= living specimen(s).
MNHN	= Muséum national d'Histoire naturelle, Paris.
NM	= Natal Museum, Pietermaritzburg.
NMV	= Naturhistorisches Museum, Wien.
NSMT	= National Science Museum, Tokyo.

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FIGS. 50-58. — Radulae of New Caledonian *Amalda* spp. : 50, 57, *A. hilgendorfi richeri* ; 51, 53, *A. montrouzieri* ; 52, 55, *A. aureomarginata*, Chesterfield variant ; 54, *A. fuscolingua* ; 56, *A. aureomarginata*, southern New Caledonia ; 58, *A. coriolis*.

Scale-lines = 100 μ m (figs. 50-52) and 50 μ m (figs. 53-58).

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